MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	Tenneson Family LLC.
Permit No.:	MTX000190
Receiving Water:	Class I Ground Water
Facility Information	
Name:	Hayfield Estates Subdivision
Mailing Address:	3630 York Road Helena, MT 59602
Contact:	Doug Sparrow
Phone:	406-227-6300
Fee Information	
Number of Outfalls:	1
Outfall - Type:	001a - Subsurface Drainfield 001b - Subsurface Drainfield 001c - Subsurface Drainfield

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I. Permit Status

This is a new permit for the proposed Tenneson Family, LLC Hayfield Estates subdivision wastewater treatment system in Helena, MT. The proposed subdivision is located southeast of the intersection of York Road and Valley Drive. The Department received the permit application and supporting documents on November 24, 2006. The application was determined to be deficient December 4, 2006. The Department received a response to the first deficiency letter on February 13, 2007 and issued a second deficiency letter on March 9, 2007. The Department received a response to the deficiency letter and a complete permit application on June 15, 2007.

II.Facility Information

A. Facility Description

The proposed Hayfield Estates Subdivision (HES) will consist of 24 single-family homes. The HES wastewater treatment system will include gravity effluent mains that will transport wastewater from each residence to a centralized recirculating sand filter, and drainfield. The centralized wastewater treatment system will consist of twentyfour (24) 1,000 gallon septic tanks one (1) effluent pump station, one (1) 22,000 gallon recirculation tank, one (1) 60' x 24' recirculating sand filters one (1) 3,400 gallon dose tank and three (3) 83.5' x 38' pressure dosed drainfields. Effluent from each septic tank will be conveyed via eight (8) inch gravity sewer mains to a pump station then via four (4) inch force main to one (1) 22,000 gallon recirculation tank. Wastewater will then be conveyed to one (1) 60' x 24' four (4) zoned recirculating sand filter via four (4) inch PVC mains. After treatment in the sand filter, wastewater will be returned to the recirculation tank via a four (4) inch drain pipe. From this point wastewater flow will be split and either returned to the recirculation tank or diverted to the 3,400 gallon dose tank. Flow will be split at a 4:1 ratio, returning 80% of the effluent to the recirculation tank and transferring 20 % to the dose tanks. From this point the effluent will be pumped to three (3) hydraulically separate, multi-zoned pressure dosed subsurface drainfields. The wastewater treatment system will have the capacity to discharge a daily maximum of 7,200 gpd (design capacity) to the groundwater.

The proposed permit authorizes discharge of residential strength wastewater to three (3) subsurface drainfields, which will then discharge to ground water. The drainfields are up-gradient hydraulically, and on the south side of the proposed subdivision. The discharge points from the dose tank are identified as Outfall 001a, 001b and 00C. The "zone 1" drainfield will be identified as outfall 001a. The "zone 2" drainfield will be identified as Outfall 001b. The "zone 3" drainfield will be identified as Outfall 001c. These outfalls will be located approximately 1.0- 2.0 feet below the ground surface. Outfalls 001a, 001b and 001c are located at N 46.63953 latitude and W -111. 91175 longitude situated in T10N, R2W, Section 7.

B. Effluent Characteristics

The wastewater treatment system is new therefore no effluent samples have been collected or analyzed. The effluent that is discharged from a typical recirculating sand filter system to the drainfield is expected to have the following average chemical characteristics:

- Total Nitrogen (sum of nitrate, nitrite and ammonia and organic nitrogen as N) 10-50 mg/L (EPA, 2002)
- Total Phosphorus: 10.6 mg/L (DEQ, 1997)
- Biological Oxygen Demand (BOD): 2-15 mg/L (EPA, 2002)
- Total Suspended Solids (TSS): 5-20 mg/L (EPA, 2002)
- Bacteria (Escherichia Coli): $10^1 – 10^3$ organisms (EPA, 2002)

III. Proposed Technology Based Effluent Limits

A Level II system must provide at least a 60 % removal of total nitrogen in raw wastewater or produce effluent with a total nitrogen concentration of 24 mg/L or less [ARM 17.30.702 (11)]. The proposed system meets the definition of level II treatment (Regensburger 2004). The Department will use 24 mg/l as an effluent limit because of the inability to accurately monitor influent quality on a wastewater treatment system incorporating individual septic tanks at each residence. A 60 % removal rate would have to be calculated for the entire treatment system. A sampling and analysis plan for determining a 60 percent removal rate was not outlined in the permit application. Therefore a value of 24 mg/L will be used as a permit effluent limit. Because an additional 7% of nitrogen removal is assumed to occur within the drainfield a proposed limit of 26 mg/L will be used. The technology-based permit limit for total nitrogen will be set at 26 mg/L (see Table 1).

The proposed technology based effluent limits for outfall 001a, 001b and 001c are presented in Table 1.

Table 1. Proposed Water Quality Based Effluent Limit for Outfall 001a, 001b and 001c

Parameter	Concentration (mg/L) Daily Maximum (1)
Total Nitrogen as N	26

(1) See definitions, Part I.A of the permit

IV. Water-Quality Based Effluent Limits

A. Receiving Water

The receiving water for outfalls 001a, 001b and 001c is ground water. According to the USGS, the Helena Valley alluvial aquifer system is the sole source of domestic water supply for about 13,000 residents (USGS http://water.usgs.gov/wid/html/mt.html). This aquifer is an unconfined alluvial system (Madison and Briar 1992). The principal water-bearing zone varies across the site. Static water levels of wells reported by the Ground Water Information Center (GWIC) and used to triangulate ground water flow direction indicate static water levels between 16.0 and 35.0 (GWIC wells 60666, 60665, and 5535).

The estimated hydraulic conductivity (K) of the aquifer is 222 ft/day. This estimate was derived from a pump test conducted in GWIC well 231342 (completed cross-gradient of the proposed discharge, in the shallowest aquifer). Aquifer tests were conducted by APEC on February 6, 2005. Schwarz Architecture and Engineering, Inc. determined hydraulic gradient and groundwater flow direction to be 0.0028 ft/ft and N 8.7°W respectively. This information was submitted to the Department as supplemental permit application materials. The three wells used to make these determinations (GWIC wells 60666, 60665, and 5535) are all within approximately one half of a mile of the site. This includes Well #1 (south east well, GWIC 60665), Well # 2 (southwest well, GWIC 6066) and Well #3 (north well, GWIC 5535) all of which are located immediately around the proposed discharge.

The permittee submitted ground water analytical data from one well (3685 Valley Drive, GWIC well 224801). Results from the March 22, 2006, July 17, 2006 and April 24, 2007 sampling events are depicted in table 2. The average Nitrate + Nitrite as N concentration for the above mentioned wells and sampling dates is 0.8 mg/L.

Table 2. Ground Water Monitoring Results or the Receiving Water

Well Identification	Date Samples	Nitrate + Nitrite (mg/L)	pH (s.u)	Conductivity (µs/cm)
3685 Valley Drive GWIC 224801	March 22, 2006	0.25	8.1	444
3685 Valley Drive GWIC 224801	July 17, 2006	1.3	8.6	303
3685 Valley Drive GWIC 224801	April 24, 2007	0.86	7.9	411

Sampling events yielded specific conductivity values of 444, 303 and 411 µs/cm. Therefore, the receiving water for Outfall 001 is Class I ground water (ground water with specific conductance equal to or less than 1,000 micro Siemens/cm) as defined by the Administrative Rules of Montana [ARM 17.30.1006 (1)(a)]. Pursuant to ARM 17.30.1006 (1) Class I ground water is to be maintained for the following beneficial uses with little or no treatment: public and private water supplies, culinary and food processing purposes, irrigation, drinking water for livestock and wildlife and for industrial and commercial uses. Water quality human health standards (DEQ-7, February 2006) apply to concentrations of substances in Class I ground waters. Pursuant to ARM 17.30.1006(1)(b)(ii) for parameters that are not listed in DEQ-7, there shall be no increase in Class I receiving water concentrations to levels that render the water harmful, detrimental or injurious to the beneficial uses listed for Class I waters. The Department may use any credible information to determine these levels. Class I ground waters are considered high quality waters and are subject to Montana's Nondegradation Policy [75-5-303, Montana Code Annotated (MCA)].

Soil profiles indicated the following soil types: Loam, Sand, Sandy loam and Loamy sand. Three test pits were dug on site. These pits revealed soils that range from loam in the first two feet to Sand and Loamy sand below that. These findings agree with the National Resources Conservation Service (NRCS) Non-Technical Descriptions of soil types expected to be found on site. The NRCS indicates that between 0 and 5 inches the soil is loam, between 5 and 10 inches very gravelly loam to sandy clay loam, between 10 and 20 inches gravely loam and between 20-60 inches very gravelly loamy sand, very gravelly sand and extremely gravely sand.

Based on proximity, the nearest surface water is the Helena Valley Irrigation Canal (lateral 14.8) located approximately 660 ft cross-gradient of the drainfields. Based on supplemental application information submitted to the Department the Helena Valley Irrigation Canal is a losing system. The Canal is an unlined system that is perched above grade, and above the alluvium of the Helena Valley Aquifer. It is expected that this canal leaches water to the groundwater at a depth of approximately 50 ft. The next closest surface water to the drainfields is an unnamed irrigation ditch, approximately 1,320 ft north and down gradient of the proposed discharge. This distance value will be used to determine nonsignificancant changes in water quality with a phosphorous breakthrough calculation.

B. Basis for Water Quality based Effluent Limits

The Montana Water Quality Act states that it is unlawful to cause pollution, as defined in 75-5-103, of any state waters, to place or cause to be placed any wastes where they will cause pollution of any state waters. The Department is required to clearly specify in any permit the limitations imposed as to the volume, strength, and other significant characteristics of discharges to state waters [75-5-402(3), MCA].

Water quality limitations must be established in permits to control all pollutant or pollutant parameters that are or may be discharged at a level which will cause an excursion from any state water quality standard. The permittee must comply with Montana Numeric Water Quality Standards included in Circular DEQ-7 (February 2006) and protection of beneficial uses (ARM 17.30.1006). Ground water quality standards may be exceeded within a Department authorized mixing zone, provided that all existing and future beneficial uses of state waters are protected (ARM 17.30.1005).

C. Nitrate

Class I ground water is considered high quality water and is subject to Montana's Nondegradation Policy 17.30.705. The proposed wastewater system is considered a new source as pursuant to ARM 17.30.702 (18)(a). The applicable ground water standard, a nitrate concentration of 7.5 mg/L at the end of the proposed standard mixing zone, is based on nondegradation rules [ARM 17.30.715 (1)(d)(iii)].

Total nitrogen is the sum of inorganic nitrogen and organic nitrogen concentration (nitrate + nitrite as N (NO_3+NO_2-N) plus ammonia and organic nitrogen as N). The Department assumes all the nitrogen discharged to the drainfield in the effluent is converted to nitrate as nitrogen. The allowable discharge concentration is derived from the mass balance water quality equation, which considers dilution and background concentration of the receiving water (EPA, 2005). Due to the size and orientation of the drainfields with respect to ground water flow, the Department considers all drainfields as one for the purpose of calculating nitrogen and phosphorus limits.

$$C_2 = \frac{C_3 (Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_1= ambient ground water (background) concentration, mg/L
C_2 = allowable discharge concentration, mg/*L*
C_3 = ground water concentration limit for pollutant at the end of the mixing zone.
Q_1 = ground water volume (ft^3 / day)
Q_2 = maximum flow of discharge (design capacity of system in ft^3 / day)

The volume of ground water that will mix with the discharge (Q_1) is estimated using Darcy's equation: Q_1 = K I A.

Where: Q_1 = ground water flow volume (ft^3/day)
K = hydraulic conductivity (ft/day)
I = hydraulic gradient (ft/ft)
A = cross-sectional area (ft^2) of flow at the down-gradient boundary of a standard 500-foot mixing zone.

$$(Q) = (222 \text{ ft/day})(0.0028 \text{ft/ft})(8{,}000 \text{ft}^2)$$
$$Q = 4{,}973 \text{ ft}^3\text{/day}$$

The design capacity of the wastewater disposal system is 7,200 gpd, or 962.6 ft^3/day. The hydraulic conductivity (K) of the alluvium is estimated at 222 feet per day (ft/d). The gradient was calculated based on well data from wells surrounding the site, at 0.0028 ft/ft. The area (A) is calculated as the cross-sectional area (ft^2) of flow at the down-gradient boundary of a standard 500-foot mixing zone, times a mixing zone depth in the groundwater of 15 feet. The applicable water quality standard of 7.5 mg/L must be met at the end of the mixing zone. The maximum nitrate concentration in the receiving water was measured as 1.3 mg/L. Therefore this value was used in calculating the allowable nitrogen concentration at the end of the mixing zone. It is assumed that the entire total nitrogen load in the seepage effluent converts to nitrate and enters the ground water.

$$C = \frac{7.5 \text{ mg/L } (4{,}973 \text{ ft}^3\text{/day} + 962.6 \text{ft}^3\text{/day}) - (1.3 \text{ mg/L}) (4{,}973 \text{ft}^3\text{/day})}{(962.6 \text{ft}^3\text{/day})}$$

$$= 39.5 \text{ mg/L}$$

Based on the mass balance equation the projected daily maximum concentration of the total nitrogen in the effluent discharged to groundwater must not exceed 39.5 mg/L at Outfalls 001a, 001b and 001c. As stated in Section III, 7% nitrogen removal is assumed to occur within the drainfield providing a final total nitrogen concentration discharged to ground water of 42.2 mg/L. These effluent limits ensure the nitrate plus nitrite (as N) concentration at the end of the ground water mixing zones are at or below the nondegradation significance criterion of 7.5 mg/L.

D. Phosphorus

Phosphorus is removed mainly through soil sorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the average load of phosphorus from the wastewater source, between the discharge point and the closest downgradient surface water [ARM 17.30.715(1)(e)]. The total phosphorus limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit. The effluent limits do not include a concentration limit for phosphorus because of the method used to determine compliance with the 50-year breakthrough criteria. Phosphorous breakthrough analysis calculations are mass based, therefore the limit will be a load based discharge limit.

The phosphorus concentration of typical residential wastewater ranges from 6.0 mg/L to 12.0 mg/L (EPA 2002). The Department considers 10.6 mg/L an average concentration of typical

residential wastewater (DEQ-Taskforce 1997). The estimated load from the drainfield based on this average and the design capacity of the wastewater treatment system is approximately 0.64 lbs/day or 232.3 lbs/year.

Due to the proximity and similar orientation of the drainfields, the Department assumes all drainfields are one for the purpose of calculating phosphorous breakthrough. Using the distance to the receiving surface water (unnamed irrigation ditch) approximately 1,320 feet north and down gradient of the proposed drainfields, the breakthrough time for phosphorus is 50.7 years. This breakthrough time is considered nonsignificant pursuant to Montana's Nondegradation criteria [ARM 17.30.715(1)(e)].

A phosphorous breakthrough would occur in 50 years (the level of significant degradation) at an effluent concentration of 8.5 mg/ L and load of 186.5 lbs/year or 0.51 lbs/day. Therefore the effluent limit for the Total Phosphorous load discharged to the drainfield shall not exceed 8.5 lbs/day or 0.51 lbs/day for Outfall 001a, 001b and 001c. The water quality based effluent limit for each outfall will therefore be set at 8.5 lb/day.

E. Escherichia Coli

A wastewater treatment system that is appropriately sited and operating properly should remove most if not all of the pathogenic bacterial indicators within 2 to 3 feet of the drainfields infiltrative surface (USEPA, 2002). An Escherichia Coli (E coli) limit has not been established in this permit due to the following site-specific criteria:

- The permittee is required to meet the E Coli ground water standard of less the 1 organisms/100 ml.
- The drainfield is pressured-dosed, which minimizes saturated conditions and therefore maximizes the die-off rate in natural sediments.
- Estimated concentration of E coli bacteria 10^6-10^8, and SWIS performance for removal of E coli bacteria is estimated to be about 99 % (EPA 2002).

The systematic dosing of the drainfield and the soil matrix of the drainfield provide natural disinfection, which will enable the DEQ-7 human health standard of <1 organism/100 ml to be achieved in the groundwater. Pathogen transport research indicates a 3-log decrease in pathogens for every meter of horizontal movement through the vadose zone and a 6-log decrease in pathogen transport for every 20 m in vertical transport through the saturated zone (Woessner, 1998). The proposed system discharges the effluent approximately 6-10 m above the ground water; additional treatment will occur prior to reaching the water table. A 3-log removal in the vadose zone indicates less than 1 colony per 100 ml within 3-feet of the discharge. No Mixing Zone will be granted for pathogens.

The proposed water quality and nondegradation effluent limits for outfalls 001a, 001b and 001c are presented in Table 3.

Table 3. Water-Quality Effluent Limits for Outfalls 001a, 001b and 001c

Parameter	Concentration (mg/L) Daily Maximum (1)	90 Day Average Load (2) (lbs/ per day)
Total Nitrogen as N	42.2	NA
Total Phosphorus as P	NA	0.51

(1) See definitions, Part I.A of the permit

(2) 90 day average load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}

F. Mixing Zone

The permittee has proposed to discharge all wastewater from Outfalls 001a, 001b and 001c to ground water. The permittee has requested and qualifies for a standard 500-foot ground water mixing zone for each drainfield in a N8.7°W direction. The permittee must comply with the ground water mixing zone rules pursuant to ARM 17.30 Subchapter 5. The concentration of pollutants at the downgradient boundary of the proposed standard mixing zone was estimated based on a mass balance calculation. Ground water standards may be exceeded within the mixing zone, provided that all existing and future beneficial uses of the state waters are protected [ARM 17.30.1005].

Groundwater flow direction was established via potentiometric map, developed from data collected from multiple monitoring and domestic wells immediately surrounding the proposed discharge site. Ground water flow direction was submitted by APEC Inc. as part of the permit application (2006) and agree with groundwater flow directions reported in USGS Water Resources Investigation Report 92-4023. The shape of the mixing zone is determined from the drainfield dimensions, information on water table elevation and area topography and groundwater flow direction (APEC, 2006), and was illustrated in supplemental information submitted with the permit application.

A ground water mixing zone will be granted for the individual parameter of nitrate [ARM 17.30.505(a)]. The concentration of Nitrate (N) must not exceed 7.5 mg/l on the down gradient boundary of the mixing zone [ARM 17.30.715 (1) (d) (iii). The permittee will be required to comply with the all applicable ground water quality standards [ARM17.30.508(1)(a)][ARM 17.30.1006(1)(a), DEQ-7] at the down-gradient edge of the mixing zone.

V. Final Effluent Limits

The proposed final effluent limitations for Outfall 001a, 001b and 001c are summarized in Table 4 and are based on the more restrictive of the technology and water quality criteria discussed in previous sections.

The final proposed effluent limit of 26.0 mg/L for nitrogen is technology based. The effluent limit for phosphorus is a water quality based nondegradation significance criteria. The water quality based effluent load limit considers the assimilative capacity of the soil system to estimate the maximum load of phosphorus discharged to the groundwater without exceeding the 50-year breakthrough. The 90 day average loads limit will provide protection for the surface and groundwater.

The permittee submitted technical information indicating a design capacity of 7,200 gpd. The design flow is the peak flow (daily or instantaneous) for sizing hydraulic facilities, such as pumps, piping, storage and adsorption systems and means the average daily flow for sizing other treatment systems. This value is used in calculations for phosphorous load limits and for calculations for determining the allowable nitrogen concentration at the end of the mixing zone. The combined flow limit from outfalls 001a, 001b, 001c shall not exceed the design capacity of 7,200 gpd based on the daily average.

Table 4. Final Numeric Effluent Limits for Outfall 001, 001b and 001c

Parameter	**Concentration (mg/L) Daily Maximum (1)**	**90 Day Average Load(2) (lbs/ per day)**
Total Nitrogen as N	26.0	NA
Total Phosphorus as P	NA	0.51(2)

(1) See definitions, Part I.A of the permit
(2) load calculation: lb/d = concentration (mg/L) x flow (gpd) x 8.34 x 10^{-6}
NA = Not Applicable

VI. Monitoring Requirements

Effluent monitoring is essential to ensure the effective treatment and consistency of the wastewater discharged from the facility. The effluent limits are established to protect the ground water from a change in water quality that would cause degradation [ARM 17.30.715] or limit a beneficial use [ARM 17.30.1006(1)(a)]. Samples or measurements shall be representative of the volume and nature of the monitored discharge. Water quality monitoring of the effluent shall occur from the dosing tank prior to discharge into the drainfields. The permittee shall monitor the flow of the effluent continuously and report the gallons per day based on the daily maximum.

The permittee shall monitor the effluent for the constituents in Table 5 at the frequency and with the type of measurement indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report that no discharge occurred.

The measurement method shall be either by flow meter and recorder or a totalizing flow meter; dose counts or pump run-times will not be accepted. Discharge flow measurement equipment must have the ability to report a daily maximum flow. To ensure that the Total Phosphorous load is calculated correctly, an accurate maximum daily flow must be measured. Maximum daily flow shall be measured when required sampling is conducted (flow measurement must correspond to sample collection to calculate an accurate load). The effluent flow rate is to be a measured and reported as a maximum daily flow.

Table 5. Outfall 001a, 001b and 001c Parameters Monitored in the Effluent Prior to Discharge

Parameter	**Frequency**	**Sample Type(1)**
Effluent Flow Rate, gpd(2) (3)	Daily(1)	Continuous(1)
Biological Oxygen Demand (BOD_5), mg/L	Quarterly(1)	Composite

Total Kjeldahl Nitrogen (TKN), mg/L	Quarterly	Composite
NO_3+NO_2 as N, mg/L	Quarterly	Composite
Total Phosphorus (as P), mg/L	Quarterly	Composite
Total Suspended Solids (TSS) mg/L	Quarterly	Composite
Total Nitrogen (as N), mg/L	Quarterly	Calculated
Total Nitrogen (as N), lb/d	Quarterly	Calculated
Total Phosphorus (as P), lb/d	Quarterly	Calculated

(1) See definitions, Part I.A of the permit
(2) If no discharge occurs during the reporting period, "no discharge" shall be recorded on the DMR report form
(3) Permittee is to report the daily maximum and 90 day average

A. Ground Water Monitoring

Ground water monitoring will be required in this permit due to the following site-specific criteria:

- Presence of three (3) drainfields in close proximity with potential for cumulative effects to state waters.
- This area is experiencing rapid growth with high density development.
- Proximity of the water table to the surface (15-20 ft below the surface).
- The shallow aquifer is a coarse grained alluvial aquifer with a relatively high hydraulic conductivity (222 ft/day).
- The need to identify the effects to ground water from the discharging wastewater treatment system.

The permittee is required to monitor the ground water on the downgradient edge of the standard 500-foot mixing zones. Based on the site map submitted by the permittee in November, 2006 one monitoring well shall be located on the downgradient edge (north side) of the mixing zone and be identified as MW-1. This well shall be located equidistant between the east and west edges of outfall 001a ("zone 1") and Outfall 001c ("zone 3"). This well shall serve as a monitoring point for the standard groundwater mixing zones. The well, shall be screened from the top of the high water table to 15 feet below the low water table. The permittee will conduct quarterly monitoring for the parameters listed in Table 6. MW-1 shall be installed prior to issuance of the final permit. Ground water monitoring shall commence upon installation of the ground water monitoring well to asses pre-discharge ground water quality at the end of the mixing zone.

Table 6. Monitoring Parameters for Monitoring Well: MW-1

Parameter	Frequency	Sample Type (1)
Static Water Level (SWL) (feet below the casing top)	Quarterly	Instantaneous
Specific Conductance, µmhos/cm	Quarterly	Grab
Escherichia Coli (Organisms/100 m*l*)	Quarterly	Grab
NO_3+NO_2 as N	Quarterly	Grab

(1) See definitions, Part I.A of this permit

If monitoring on the downgradient edge of the mixing zone demonstrates that ground water quality standards or nondegradation water quality significance criteria in the receiving ground water are exceeded as a result of the permitted discharge the permittee shall initiate monthly sampling and analysis of MW-1 for a minimum of one year (12 consecutive months) if any of the following occurs:

1. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L within any sample from the ground water monitoring well located at the boundary of the mixing zone during any regularly scheduled quarterly monitoring event.
2. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L in both the regular quarterly monitoring sample and the required re-sample during 2 consecutive quarterly monitoring periods, or within 50% of the monitoring results within any consecutive 12-month period.

VII. Significance Determination

The Department has determined that the discharge constitutes a "new or increased source" and is subject to Montana Nondegradation Policy (75-5-303, MCA ARM 17.30.702(16)). The Department has determined this discharge is nonsignificant with respect to nitrogen as concentrations at the end of the mixing zone are predicted to be less than 7.5 mg/L. Phosphorus load limits are based on nondegradation significance criteria for 50-year break-through to surface water in accordance with ARM 17.30.715(1)(e). Therefore, discharge in compliance with the limitations of this permit constitutes nonsignificant degradation.

VIII. Special Conditions

a) Effluent Flow Measurement

Prior to issuance of the final permit, the permittee shall submit to the Department the method of effluent flow monitoring. Effluent flow shall be monitored following treatment in the sand filter and prior to discharge into the drainfield. The measurement method shall be either by recorder or a totalizing flow meter, dose counts or pump run-times will not be accepted. The permittee shall monitor the flow of the effluent continuously.

b) Monitoring Well Installation

Prior to issuance of the final permit, the permittee shall submit to the Department for approval a plan for compliance ground water monitoring well installation as well as a brief summary of a monitoring, sampling and analysis plan for monitoring wells installed onsite. The plan is to include the location, conceptual design and construction methods of the planned ground water monitoring well, and the monitoring, sampling and analysis methods that will be used to meet the monitoring required in the Permit. The well shall be located in the centerline of the terminus of the Outfall 001a, 001b and 001c drainfields at the end of the mixing zone.

Prior to discharge the permittee shall submit to the Department a brief report or letter documenting the results of the monitoring well installation including the final location of the installed monitoring well, construction details for the well and a report on ground water quality

in the from the well. Ground water quality analysis shall include those parameters listed in Table 6. Ground water quality monitoring shall begin upon installation of the well (prior to commencement of discharge) and continue though the duration of the permit.

IX. Information Source

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

APEC, Inc. MGWPCS permit application submitted to DEQ in November of 2006

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002

Department of Environmental Quality, DEQ Taskforce (1997), Meeting Minutes-Efficiency of Level II systems.

Department of Environmental Quality, Nitrate Sensitivity Analysis Input Data, DEQ summary paper, September 1, 1994

Environmental Protection Agency, U.S. EPA NPDES Permit Writers Manual, December 2005

Environmental Protection Agency, Design Manual: Onsite Wastewater Treatment System Manual. EPA 625/R-00/008, 2002.

Fetter, C.W., Applied Hydrogeology., 1988

Madison, P.J., Briar, W.D., Hydrology of the Helena Valley-Fill Aquifer System, West Central Montana , USGS Water Resources Investigation Report 92-4023, 92p. 1992

Regensburger, E. Nutrient-Reducing Wastewater Treatment System Designation Form. Montana Department of Environmental Quality. 2004

Woessner, W., Thomas, Troy., Ball, Pat and DeBorde, Dan C., (April 1998), Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Flow Zone: Challenges to Natural Disinfection. , University of Montana., Missoula, Montana

Prepared By: Louis Volpe June 20, 2007